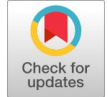


Analysis and Prevention of Road Accidents for Gautam Buddha Nagar District (U.P)



Divyanshu Dev, Khyati Varshney, Rohit Ralli, Shobha Ram, Deependra Kumar Varshney

Abstract: Road accidents pose a significant threat to public safety, necessitating proactive measures for analysis and prevention. This abstract delves into the analysis and prevention of road accidents in the Kasna to Surajpur region over a seven-year period from 2015 to 2021. Through data gathered from multiple police stations, the study aims to identify accident causes, locations, and frequencies to pinpoint blackspots for future road safety audits. Additionally, a novel solution leveraging Pascal's law is proposed to minimize accidents and we can determine the Number of vehicles and Types of vehicles. The system, triggered by vehicle movement, alerts drivers on the opposite side of the road to reduce speed, thus mitigating collision risks. This innovative approach offers promise in enhancing road safety and reducing accidents.

Keywords: Road Accident, Location, Frequency, Blackspots, Pascal's law, Innovative Approach

I. INTRODUCTION

It is acknowledged that one of the biggest issues facing the world today is traffic accidents. It also has a big impact on the economics and progress of a country and society. Conflicts between the movements of vehicles can result in delays and traffic congestion, which in turn leads to road accidents. Road conditions, traffic, human error, and the surrounding environment have all been found to have a significant impact on driving behavior, which can ultimately lead to traffic accidents (PARI CHOWK, KASNA). Impact driving behavior, which in turn can play a role in traffic accidents. Despite numerous measures implemented by the Uttar Pradesh government, the number of road accidents rises annually. The increase is in line with population growth, economic expansion, industrialization, and motorization.

A. Accident on the Road

On national highways, mostly fatal traffic accidents occur. Due to the increased volume of goods traffic on the National Highway, trucks are the most common kind of vehicle involved in accidents.

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While 34% of good traffic travels on the 9% State Highway, 38% of it travels on the 2% National Highway. Nonetheless, a government-derived estimate suggests that roughly one-third of all fatal traffic crashes occur on National routes, with the other one-third occurring on State routes. Every day, several traffic accidents are reported. There were 487 documented accidents between 2015 and 2021, with 69 fatalities. As a result, there were nine traffic fatalities on average per day. There were three deaths for every ten registered vehicles.

B. Study Area

The number of deadly accidents from 2015 to 2021 was collected from the Gautam Buddha Nagar Police Station. It is found that from the data of accidents registered collected from the headquarters of Traffic Advisor Greater Noida, the place where FIRs records exist. The print for enlisted traffic Injury cases within the boundary of the city for both fatal and non-fatal was taken from the office of the Noida police official website along with the FIR Number and the name of the police station. The FIR cases with a charge of charge 304A were collected, and essentially, at least one person died in such cases.

C. Accidental Data Examining

After collecting data from the years 2015 to 2021, we found that the accident took place in Noida. System studies can be very helpful; the accident occurred at many places in the city to find out the causes of accidents. Moreover, One can assess the nature of accidents together with its classification. Furthermore, the kinds of collisions and vehicles involved with monthly classification can provide valuable information for detailed analysis. The assessment of these accidents is done, and findings are shown in the bar plot.

D. Crash Matrix

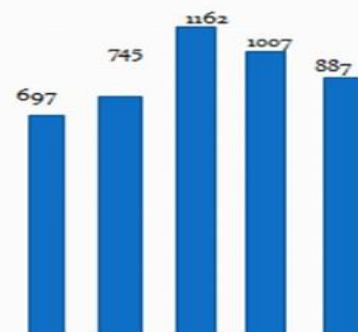


Fig.1. Road Crashes from 2015 to 2021



Fig.1 displays the car that caused the incident together with the crash matrix of the victim the fatal accident from Kasna-Pari Chowk in the years 2015, 2016, 2017, 2018, 2019, 2020, and 2021.

E. Composition of Vehicle-Wise Road Accidents

The type of vehicles such as cars, van, jeep, and trucks are the most commonly used in the city Greater Noida caused 6% deaths. However, the 2% deaths were reported by 2 Axle Heavy Goods and this percentage of deaths was same for the buses. However, for 5% deaths, type of vehicle was not known. In the listed table No. 3 provides the composition of impacting vehicles in Greater Noida.

Table 1. Road Deaths during 2021

Type of Vehicles	No. of Accidental Deaths	Percentage
Truck/lorry	01	5.83
Bus	07	1.32
Tempo/van	09	1.69
Jeep	90	16.92
Car	77	14.47
Three-wheeler	68	11.84
Two-wheeler	98	18.42
Bicycle	54	10.15
Pedestrians	57	10.11
Others	26	4.80
Total	487	

F. Nature of Accident

It seems from Table 2, that very serious accidents(fatal) in which at minimum one to four persons have died. Minor injuries caused by an accident were 31% of the total, whereas 44.17% of the total caused serious injuries in accidents. Different types of accidents in years are listed below.

Table 2. Types of Accidents in a Year

Year	fatal	Serious	Minor	Total Accidents
2015	9	4	12	25
2016	5	3	6	14
2017	3	11	8	22
2018	8	12	15	35
2019	12	8	14	34
2020	8	13	18	39
2021	4	14	18	37

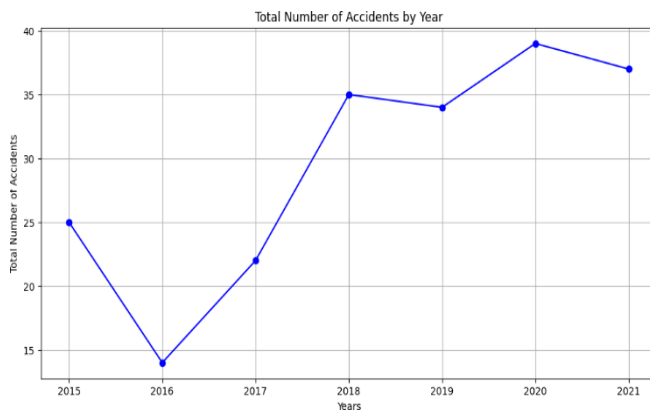


Fig. 2. Total Number of Accidents by Year

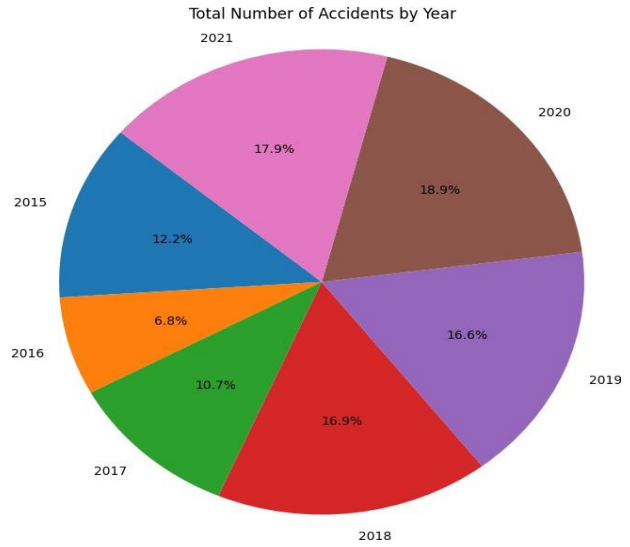


Fig. 3. Year-Wise Classification of Road Accident

G. Victim Gender

Although the of males that drive the vehicle is higher than women, therefore the number of accidents for male gender was 86.6 % of males inclined to fatal injuries in comparison to females. Table 3 lists the genderwise deaths and Fig 2 shows their respective percentage.

Table 3. Gender-Wise Deaths

Gender	Deaths	% of deaths
Men	201	86.6%
Women	35	15.08%
Unspecified	1	0.5%

H. Day of Accident

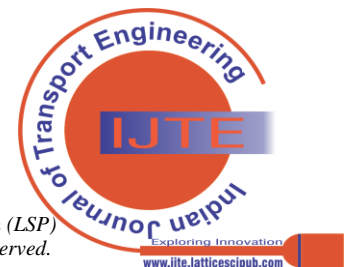
It was observed that from Kasna to Pari Chowk most fatal accidents occurred on Tuesday, followed by Wednesday and then Sunday and Friday. Table no.7 reveals the percentage involved in it.

Table 4. Day of Accidents

Day	Deadly Collision	Percentage
Sunday	34	15%
Monday	28	12%
Tuesday	38	16%
Wednesday	36	16%
Thursday	31	13%
Friday	24	15%
Saturday	29	13%

I. Dark Areas of Accident

The Gautam Buddha Nagar district registered 162 fatalities in 317 accidents between March 1 and September 15, 2019, according to data from the local transport department. According to Prashant Tiwari, the assistant regional transport officer (ARTO-Enforcement) for Gautam Budh Nagar, 35 "black" locations have been identified by the transport department and traffic police. According to data from the Gautam Buddha Nagar district's district transport department, there were 501 accidents in 2021 that resulted in 238 fatalities and 348 injuries.



The data covered the period from January 1 to August 31. Prashant Tiwari, the assistant regional transport officer (ARTO-Enforcement) of Gautam Budh Nagar, stated that the transport department and traffic police were able to identify 221 fatalities and 345 injuries in the same months of 2020. about thirty "black" dots.

Kasna to Parichowk Road, Surajpur, Pari Chowk (Greater Noida), Toll Plaza (Jewar), Yamuna Expressway, DND Flyway (Noida), zero point (Greater Noida), etc. are some of the cities that come under black spot. Fig 4 shows the number of black spots on the top 10 highways.

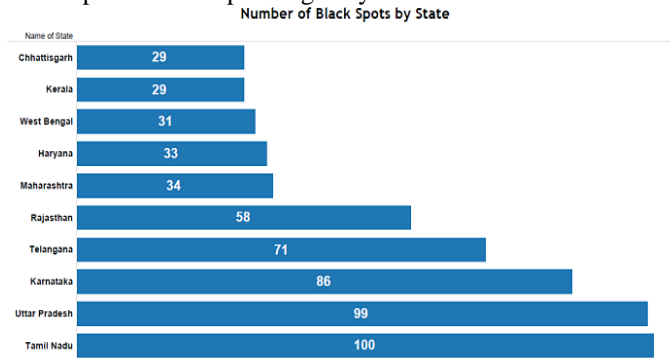


Fig 4. Number of Blackspots

II. METHODOLOGY

A. General

Any amendment to already existing stretch is implemented based on the traffic growth rate from the past trends that depends solely how fast the number of vehicles grow. However, But the same can not be applied to the cause of accidents in that stretch. Due to the high frequency of accidents, minor advancements may not be able to completely prevent accidents in the affected stretch. What could be an excellent job is to create an accident prediction model in an effort to lower the amount of accidents that may occur in future. This will not help to resolve the measures to be taken but also advancement to be done to assure safety for road users in National Highways.

B. Methods use for Collecting Data

The research is carried out by accumulate the information and data analysis from the following sources:

C. Data Collected by Various Discussions or by other Source

The data linked to the number of road accidents and its reason along with the types of vehicles used age profile of the victims from the district and also at all India level is gathered from the official websites of various government departments as well by self-made attempts throughout departments in the city. Additionally, information about traffic police actions in the GB district, including the imposition of penalties, information about the population of Greater Noida, the road network, and the strength of the Gautam Buddha Nagar Traffic Police, and information about the measures taken by various government departments at the national and state levels to improve road safety were obtained from relevant departments through RTI or in-person visits. Utilized data for the analysis will be accumulate by interview survey performed from the area of Kasna to Pari Chowk in Greater Noida.

The approach and methodology will be used in the study is

following:

- Study of the literature across all India levels and especially in the Surajpur area.
- A case study has to be done for the collection of data.
- After that data is collected, then reading or analysis and then interpretation are done.
- Then final results will be discussed.
- Finally, conclusions will be made and give suggestive measures to solve the problem.

Table 5 has a list of police station headquarters and various IPC sections along with explanations.

Table 5. Greater Noida Police Station List

S.No	Police Station
1	Bisrakh Police Station
2	Beta 2 Greater Noida
3	Kasna, Greater Noida
4	Knowledge Park, Greater Noida
5	Surajpur
6	Dankaur Police Station
7	Ecotech 1 Police Station
8	Ecotech 3 Police Station
9	Badalpur Police Station
10	Dadri Police Station
11	Jarcha Police Station
12	Jewar Police Station
13	Rabupura Police Station

Finding the cost of accidents of different years with the help of the wholesale price index (WPI)

Additionally, there are other kinds of accidents, including non-injury, fatal, grievous, minor, and harm to the property, which could include components of the road or automobiles. However, the effects of each kind of accident on the economy are distinct from one another. As a result, all accident kinds must be combined into one unit, the Accident Severity Index (ACCI), and given the appropriate weighting. Weighting was assigned for the same in accordance with the accident's cost. The aforementioned is regarded as the independent variable, and it depends on the 15 dependent variables that were determined based on the likelihood of accidents occurring. Accidents cost the country a significant amount of money. Regrettably, the assessment of the cost of accidents is a contentious and challenging topic. The work that has been completed in India thus far is really limited. The Central Road Research Institute has made an effort to calculate the financial toll that traffic accidents in India cause. Around the world, several approaches are being used. The accident costing in India is published by the Indian Road Congress in IRC SP:30-1990 (Clause 6.8).

D. Source of the Data

The National Road Safety Commission of Greater Noida provided secondary data, which was largely utilized in the study. Data on accidents was gathered from Pari Chowk's several police stations, while information on population was gathered from the city's population department. Specifically, the data included time series data for Kasna to Pari Chowk covering the years 2015 to 2021 on annual traffic accidents and the related population numbers.



E. Prevention

The primary causes of mishaps

1. Transitional Problems: Traffic in the city is mixed. There are various issues when traffic is not segregated. The city takes a "reactive" (responding to problems) approach, but there is no proactive one at all.
2. The city has a dismal track record when it comes to traffic safety and congestion. Technology is lacking in the city.
3. Shoulders are not provided near pavement.
4. The old city area is clogged in multiple places.
5. There are no facilities for pedestrians in the Kasna area.
6. Parking problems occur all around the city.
7. The majority of roadways lack footpaths. If they are there, they are either poorly maintained or completely inhabited. Disabled people cannot use pathways.
8. Traffic light synchronization is necessary to enable platoon mobility.
9. The regulations pertaining to drunk driving, overloaded vehicles

10. People are not following helmet rules.

11. Base parking has not been a particularly strict regulation.

III. RESULTS

From this research we were able to find a solution to minimize the number of accidents, also we can determine the number of vehicles passing like cars, trucks, etc and Types of vehicles passing using this model. The model works on the principle of Pascal's law, when the vehicle is traveling, it triggers the system that is embedded in the road, which in turn notifies the other drivers on the other side of the road so they can reduce their speed greatly reducing the risk of collision from the incoming traffic that they would not have seen otherwise. The system is pressure sensitive and is activated as soon as any vehicle's Tyre comes in contact with a pressure sensitive plate that is embedded in the road, which results in increased water level, and it completes the circuit activating the system due to the Pascal's law which can be seen in Fig 5.

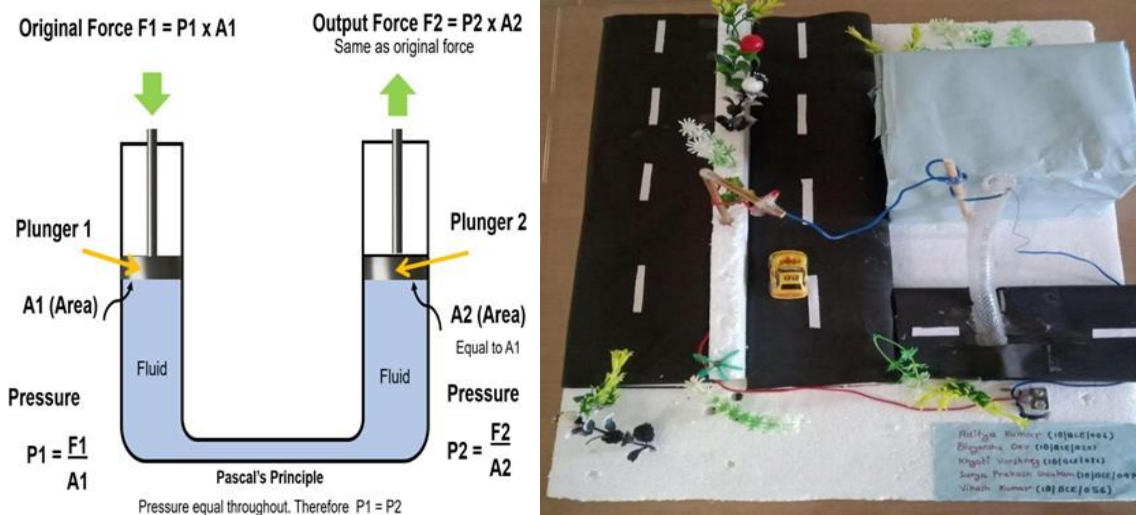


Fig. 5. Circuit Activating the System Due to the Pascal's Law

IV. CONCLUSIONS

The purpose of the accident dissection is to identify the different causes of accidents, as well as their location and frequency, in order to identify blackspots and conduct a road safety audit there in the future. Data is gathered from the several police stations that serve the Kasna to surajpur region throughout a seven-year period. The information was gathered between 2015 and 2021. The following conclusion can be made based on accident detail taken from Kasna to Pari Chowk or Surajpur for the years 2015 to 2021:

1. From this study the accident data varies from year to year. The government and authorities should take this seriously and implement preventative measures to stop further accidents.
2. In order to rate the accident blackspots along the route from Kasna to Pari Chowk and identify dangerous road accidents, this study also established an accident point weightage.
3. According to the outcome, the path from Kasna to Pari Chowk is the most.
4. The outcome indicates that the riskiest route is the one that goes from Kasna to Pari Chowk. The Gautam Buddha Nagar Police provided the data that supported

this outcome.

5. Blackspots in Greater Noida include the DND Flyway, Rajnigandha Chowk, Round about at parichowk., zero points of the Noida-Greater Noida Expressway and, near Kasna to parichowk, Yamuna Expressway, ,surajpur, Pari Chowk in Greater Noida, and Jewar Toll Plaza.
6. Trucks and lorries account for 5.83% of accidents, buses for 1.22%, tempo/van for 1.43%, jeeps for 16.42%, cars for 14.47%, three-wheelers for 11.84%, two-wheelers for 18.42%, bicycles for 10.15%, pedestrians for 10.21%, and unidentified vehicles for 4.80% of accidents that occur because they hit something and flee.
7. There were 15% of accidents on Sunday and Monday, and 13% on Saturday. The hours of greatest accidents are from 7:00 to 8:00 A.M and 7:00 to 9:00 P.M.

RECOMMENDATIONS

1. Pavement markings and road signs should be maintained weekly Basis.
2. Geometric parameters should be proper when pavement is designed. Because two and three wheeler vehicles most commonly used by middle- class and lower class Areas.
3. Maximum pedestrians and cyclists should follow traffic Rules..
4. Provided deficiencies in the current road alignment or geometry, signs board. In areas where accidents occur often, physical controls like speed breakers, rumbling Strips need to be properly marked with warning signs.
5. Proper observation of traffic behavior and road features, such as the number of intoxicated drivers, driving speed, seat belt usage, etc.
6. Strictly use rules made by the different state governments.
Should provide Knowledge about the road safety.

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Availability of Data and Material	Yes, data access or material availability is required. Gautam buddha nagar UP and from goggle etc
Authors Contributions	All authors having equal contribution for this article.

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